

## **ABSTRACT OF THE DISCLOSURE**

Embodiments of the invention generally provide an electron beam substrate processing system. In one embodiment, the present invention provides an electron beam substrate processing system where a spindle shaft used to rotate substrates during processing includes at least one optical encoder wheel assembly. The optical encoder wheel assembly is configured to provide rotational speed data signal to a rotational speed control system and a pattern generation clock circuit configured to provide a corrected pattern generator clock signal to a pattern generator circuit. The pattern generation circuit is used to control modulation of an electron beam used for substrate processing. In one aspect of the present invention, repeatable deviations of the rotational speed are measured and processed during substrate processing to correct for such repeatable deviations to increase substrate pattern writing accuracy.